

**THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:**

1. A vehicle external rear view mirror assembly having an extension and retraction mechanism for a pair of telescopic arms that connect a mirror head to a mirror mounting bracket, the assembly comprising:
  - 5 a bracket and a mirror head;
  - a pair of spaced apart substantially parallel hollow outer arm assemblies extending from the bracket, each outer arm assembly having a front portion and a rear portion, the front portion having a rack extending longitudinally of the arm towards a distal end;
  - 10 a pair of spaced apart substantially parallel inner arm assemblies mounted to the mirror head and extending into respective outer arm assemblies for relative sliding movement out of and into respective outer arm assemblies, each inner arm assembly having a front portion and a rear portion;
  - a pair of driving pinion gears, each gear rotatably supported within the mirror head in a position in line with a respective inner arm assembly and engaging a  
15 respective rack;
  - a pinion drive shaft assembly mounted to the mirror head and having a drive shaft extending between the pinion gears along a drive axis;
  - a drive motor mounted to the mirror head, the motor having an output shaft;
  - 20 and
  - a gear train operatively interposed between the output shaft and the pinion drive shaft assembly, the drive motor driving the inner arm assemblies to move telescopically with respect to their respective outer arm assemblies,
  - wherein each outer arm assembly is recessed back from the distal end towards  
25 the bracket to allow the pinion drive shaft to travel towards the bracket behind the front portion of the outer arm assembly.
2. An assembly as claimed in claim 1 further comprising one or a pair of stability systems, for one or each telescopic arm, one or each stability system comprising:
  - 30 an inboard contact surface;

an outboard contact surface laterally spaced apart from and outboard of the inboard contact surface with respect to the bracket, both contact surfaces located at the front portion of its respective inner arm assembly and engaging the front portion of the outer arm assembly; and

5        an intermediate contact surface located at the rear portion of its respective inner arm assembly at a lateral position intermediate the inboard and outboard apart contact surfaces and engaging the rear portion of the outer arm assembly.

10       3. An assembly as claimed in claim 2 wherein, for one or each stability system, any two of the inboard, outboard and intermediate contact surfaces are fixed with respect to its respective inner arm assembly and the other of the inboard, outboard and intermediate contact surfaces is resiliently moveable and outwardly biased with respect to its respective inner arm assembly.

15       4. An assembly as claimed in claim 3 wherein the or each intermediate contact surface is resiliently moveable with respect to its respective inner arm assembly.

20       5. An assembly as claimed in claim 4 wherein the or each intermediate contact surface is supported by a leg that is hingedly mounted about a knife edge to its respective inner arm assembly, the knife edge disposed laterally with respect to the inner arm assembly.

25       6. An assembly as claimed in claim 5 wherein the or each stability system further comprises a spring mounted between its respective inner arm and the leg to bias the intermediate contact surface into engagement with the rear portion of its respective the outer arm assembly.

30       7. An assembly as claimed in claim 6 wherein the or each intermediate contact surface is a surface of a wheel, the wheel rotatably supported by the leg.

8. An assembly as claimed in claim 1 wherein the pinion drive shaft comprises a unitary shaft of constant non-circular cross section.
9. An assembly as claimed in claim 8 wherein the shaft is metal.
- 5 10. An assembly as claimed in claim 9 wherein the shaft assembly further comprises a pair of spaced apart hubs, each hub defining an aperture lockably receiving the shaft and an outer bearing surface engaging the mirror head.
- 10 11. An assembly as claimed in claim 10 wherein each hub passes through and keys to a respective pinion gear thereby securing the pinion gear to the shaft for rotation therewith.
12. An assembly as claimed in claim 3 wherein the front portion of the outer arm  
15 assembly comprises a rack member defining said rack and a pair of parallel spaced apart rails located either side of the rack, the rails of the rack member engaged by the inboard and outboard contact surfaces to stabilise the inner arm assembly with respect to the outer arm assembly.
- 20 13. An assembly as claimed in claim 1 wherein at least one of the racks is longitudinally split into a pair of spaced apart parallel rack portions with a channel between the rack portions and wherein its respective pinion gear is mutually shaped such that a cable can be accommodated within the channel for power transmission from the vehicle to the mirror head.
- 25 14. A vehicle external rear view mirror assembly having an extension and retraction mechanism for a pair of telescopic arms that connect a mirror head to a mirror mounting bracket, the assembly comprising:  
a bracket and a mirror head;  
30 a pair of spaced apart substantially parallel hollow outer arm assemblies

extending from the bracket, each outer arm assembly having a front portion and a rear portion, the front portion having a driven portion extending longitudinally of the arm towards a distal end;

5 a pair of spaced apart substantially parallel inner arm assemblies mounted to the mirror head and extending into respective outer arm assemblies for relative sliding movement out of and into respective outer arm assemblies, each inner arm assembly having a front portion and a rear portion;

10 a pair of driving wheels, each wheel rotatably supported within the mirror head in a position in line with a respective inner arm assembly and engaging a respective driven portion;

a main drive shaft assembly mounted to the mirror head and having a drive shaft extending between the driving wheels along a drive axis;

a drive motor mounted to the mirror head, the motor having an output shaft; and

15 a gear train operatively interposed between the output shaft and the main drive shaft, the drive motor driving the inner arm assemblies to move telescopically with respect to their respective outer arm assemblies,

20 wherein each outer arm assembly is recessed back from the distal end towards the bracket to allow the main drive shaft to travel towards the bracket behind the front portion of the outer arm assembly.

15. An assembly as claimed in claim 14 wherein respective driving wheels and driven portions are mutually shaped such that a wedging action occurs between each driven wheel and its respective driven portion,

25 thereby reducing the tendency for slippage to occur between each driven wheel and its respective driven portion.

16. An assembly as claimed in claim 15 wherein each driven portion comprises a pair of parallel spaced apart inwardly converging driven surfaces for wedgeably

receiving the driving wheel.

17. An assembly as claimed in claim 14 wherein the pinion drive shaft comprises a unitary metal shaft of constant non-circular cross section.
- 5 18. An assembly as claimed in claim 17 wherein the shaft assembly further comprises a pair of spaced apart hubs, each hub defining an aperture lockably receiving the shaft and an outer bearing surface engaging the mirror head.
- 10 19. An assembly as claimed in claim 18 wherein each hub passes through and keys to a respective driving wheel thereby securing the driving wheel to the shaft for rotation therewith.
20. A vehicle external rear view mirror assembly having at least one telescopic arm that connects a mirror head to a mirror mounting bracket, the assembly comprising:
- 15 a bracket and a mirror head;
- a hollow outer arm assembly extending from the bracket, the outer arm assembly having a front portion and a rear portion;
- 20 an inner arm assembly mounted to the mirror head and extending into the outer arm assembly for relative sliding movement out of and into the outer arm assembly, the inner arm assembly having a front portion and a rear portion; and
- a stability system, the stability system comprising:
- an inboard contact surface;
- 25 an outboard contact surface laterally spaced apart from and outboard of the inboard contact surface with respect to the bracket, both contact surfaces located at the front portion of its respective inner arm assembly and engaging the front portion of the outer arm assembly; and
- an intermediate contact surface located at the rear portion of the inner arm assembly at a lateral position intermediate the inboard and outboard apart
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contact surfaces and engaging the rear portion of the outer arm assembly,  
wherein any two of the inboard, outboard and intermediate contact  
surfaces are fixed with respect to the inner arm assembly and the other of the  
inboard, outboard and intermediate contact surfaces is resiliently moveable and  
outwardly biased with respect to the inner arm assembly.

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21. An assembly as claimed in claim 20 wherein the intermediate contact surface is  
supported by a leg that is hingedly mounted about a knife edge to the inner arm  
assembly, the knife edge disposed laterally with respect to the inner arm  
assembly.

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22. An assembly as claimed in claim 21 wherein the stability system further  
comprises a spring mounted between the inner arm and the leg to bias the  
intermediate contact surface into engagement with the rear portion of the outer  
arm assembly.

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23. An assembly as claimed in claim 22 wherein the intermediate contact surface is a  
surface of a wheel, the wheel rotatably supported by the leg.

20 24. A vehicle external rear view mirror assembly having an extension and retraction  
mechanism for a telescopic arm that connect a mirror head to a mirror mounting  
bracket, the assembly comprising:  
a bracket and a mirror head;  
a hollow outer arm assembly extending from the bracket, and having a driven  
portion extending longitudinally of the arm towards a distal end;  
25 an inner arm assembly mounted to the mirror head and extending into the  
outer arm assembly for relative sliding movement out of and into the outer arm  
assembly;  
a driving wheel, rotatably supported within the mirror head in a position in  
30 line with the inner arm assembly and engaging the driven portion;

a main drive shaft assembly mounted to the mirror head and having a drive shaft extending between the driving wheels along a drive axis;

a drive motor mounted to the mirror head, the motor having an output shaft; and

5 a gear train operatively interposed between the output shaft and the driving wheel, the drive motor driving the inner arm assembly to move telescopically with respect to the outer arm assembly,

wherein the driving wheel and driven portion are mutually shaped such that a wedging action occurs between the driven wheel and the driven portion, the  
10 wedging action reducing the tendency for slippage to occur between the driven wheel and the driven portion.

25. An assembly as claimed in claim 24 wherein the driven portion comprises a pair of parallel spaced apart inwardly converging surfaces for wedgeably receiving  
15 the driving wheel.